

# **PROGRAMMABLE LIGHT SOURCE DEVICE FOR MOBILE PHONE DISPLAY**

## **CROSS-REFERENCE TO RELATED APPLICATION**

**[0001]** The present invention is a continuation-in-part of US Patent Application Ser. No. 09/604,269 filed on June 26, 2000.

## **FIELD OF THE INVENTION**

**[0002]** The present invention relates to a light source device for mobile phone displays and, more particularly, to a programmable light source device employing electroluminescence panels as the mobile phone display.

## **BACKGROUND OF THE INVENTION**

**[0003]** A mobile phone with a light source, such as a light emitting diode (LED), can be operated under insufficient light environment as the LED light source device provides illumination. However, the LED light source is a "dot" light source and the intensity or brightness of the "dot" light source decreases as the distance from the source increases. Therefore, the luminance of LED is not even. In addition, LED can only be positioned at the lateral side of a liquid crystal display (LCD) and therefore, the illumination effect of this conventional light source device is poor.

**[0004]** In order to improve the illumination effect, one of the conventional methods is to increase the number of the LEDs. For most mobile phones available in the market, four LEDs are arranged in a row and located beside the LCD. However, this method also increases the electrical energy consumption as well as the difficulty of mounting additional electrical elements. Furthermore, the problem of the unevenness of a "dot" light source still remains. It is imperative to find an alternative light source to meet the continuous progress in mobile phones.

## **SUMMARY OF THE INVENTION**

**[0005]** Accordingly, it is an object of the present invention to provide a programmable light source device for mobile phone display, comprising an electroluminescence panel and a driving integrated circuit (IC) mounted within a housing of the mobile phone. The driving IC is programmable in that it can receive instructions from the user, and based on the instruction to set the color change pattern.

**[0006]** Another object of the present invention is to provide a programmable light source device for mobile phone display, wherein the electrical energy consumption is lower than that of the LED.

**[0007]** Yet a further object of the present invention is to provide a programmable light source device for mobile phone display, wherein the illumination effect is better than that of a light source employing an LED.

**[0008]** These and other objects, features and advantages of the invention will be apparent to those skilled in the art, from a reading of the following brief description of the drawings, the detailed description of the preferred embodiment, and the appended claims.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

**[0009]** Figure 1 shows a perspective exploded view of the present invention.

**[0010]** Figure 2 shows a circuit diagram of the electroluminescence panel and the driving IC in accordance with the present invention.

**[0011]** Figure 3 shows a structural diagram of the electroluminescence panel in accordance with the present invention.

#### **DETAILED DESCRIPTION OF PREFERRED EMBODIMENT**

**[0012]** For the purpose of promoting an understanding of the principles of the invention, references will be made to the embodiment illustrated in the drawings. Specific languages are used in description. It should, nevertheless, be understood that no limitation of the scope of the invention is thereby intended, such alterations and further modifications in the illustrated device, and such further applications of the principles of the invention as illustrated herein being contemplated as would normally occur to one skilled in the art to which the invention relates.

**[0013]** Figure 1 shows a perspective exploded view of the present invention. In accordance with the present invention, a phone panel 12 of a mobile phone is appropriately located on a lower housing body 13 of the mobile phone. An LCD display 11 is located above an electroluminescence panel 7, closely combined together with a lower housing body 13 of the mobile phone.

**[0014]** Figure 2 shows a schematic view of the driving circuit and the electroluminescence panel of the present invention. In accordance with the present invention, a driving IC 1 is provided with five or four connection pins. The driving IC 1 includes a circuit for regulating the voltage and a circuit for time pulse control. A first connection pin 6 and a second connection pin 5 of the driving IC 1 are connected to a first control connection pin 8 and a second connection pin 9 of the electroluminescence panel 7, respectively. Connection pins 2 and 3 of the driving IC 1 are connected to positive and negative terminals of a power source, respectively. A ground wire 4 is also provided. A voltage  $V_{cc}$  that drives the electroluminescence panel 7 is provided by a phone plate 12 of the mobile phone. Through the voltage regulating circuit of the driving IC 1, the frequency can be changed and the electroluminescence panel 7 is able to emit light of different wavelengths, namely, exhibition of color changes. In addition, the time pulse control circuit of the driving IC 1 is used to control the timing of color change of the electroluminescence panel 7, for example, every two seconds.

**[0015]** In accordance with the present invention, when the mobile phone is turned ON, or a keypad is pressed, a control circuit of phone plate 12 provides a control signal to the driving IC 1. Furthermore, the keypad can also serve as an input device for the user to select and set the desired operation effect of the electroluminescence panel 7. Hence, the timing and patterns of color change of the electroluminescence panel 7 is programmable.

**[0016]** As shown in Figure 3, the connection pins 8, 9 of the electroluminescence panel 7 are connected respectively to the connection pins 6, 5 of the driving IC 1 for transmitting driving signals of high and low voltage levels. As the electroluminescence panel needs a high/low voltage to drive, the driving IC 1 is provided in the present invention to drive the electroluminescence panel 7 and to cause color change.

**[0017]** Experiments show that the electrical energy consumption of the electroluminescence panel is much less than that of an LED. Also, the light emitted from the electroluminescence panel is a surface light source, which provides better illumination effect than a dot light source, such as the LED. In addition, as the light source of the electroluminescence panel is located beneath the LCD, the illumination effect is better than the LED light source located at the side of the LCD.

**[0018]** While the invention has been described in connection with what is presently considered to be the most practical and preferred embodiment, it is to be understood that the invention is not to be limited to the disclosed embodiment, but, on the contrary, it should be clear to those skilled in the art that the description of the embodiment is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims.